WHAT IS CLAIMED:

1.   A waveguide plate with a plate-like glass substrate, carrying a waveguiding layer, with at least one coupling grating on the surface carrying said waveguiding layer, which coupling grating is formed as a grating of lines with a period between 150 nm and 1000 nm, the extension of said grating being at least 5 cm with lines parallel to one another,

      wherein the coupling angle (Θ) varies by not more than 0. 1 °/cm along a line of said grating and wherein the absolute value of the deviation of the coupling angle on said waveguide plate, from a predefined desired value, does not exceed 0.5°.

2.   A waveguide plate according to Claim 1,

      wherein the extension of said coupling grating along said line is at least 1 cm.

3.   A waveguide plate according to Claim 1,

      wherein the coupling angle (Θ) varies by not more than 0.05°/cm along said line.

4.   A waveguide plate according to Claim 1,

      wherein the absolute value of the deviation of the coupling angle (Θ) from its average value on the waveguide plate does not exceed 0.3°, preferably not 0.15°.

5.   A waveguide plate according to Claim 1,

      wherein the refractive index of the waveguiding layer is

between 1.65 and 2.8.

6.　A waveguide plate according to Claim 1,

　　wherein the waveguiding layer comprises Ta_2O_5, Nb_2O_5, TiO_2, ZrO_2, Al_2O_3, SiO_2-TiO_2, HfO_2, Y_2O_3, SiOxNy, Si_3N_4, HfDxNy, AlOxNy, TiO,,Ny, MgF_2 or CaF_2.

7.　A waveguide plate according to Claim 1,

　　wherein the thickness of the waveguiding layer is between 50 nm and 200 nm.

8.　A waveguide plate according to Claim 1,

　　wherein a groove / land ratio is between 0.3 : 1 and 3 : 1, preferably between 0.7 : 1 and 1.5 : 1.

9.　A waveguide plate according to Claim 1,

　　wherein a grating depth of the at least one coupling grating is between 5 nm and 75 nm.

10.　A waveguide plate according to Claim 1,

　　wherein the at least one coupling grating covers only a part of the surface of the waveguide plate, whereas a residual part of the surface of said waveguide plate is uncovered.

11.　A waveguide plate according to Claim 10,

　　wherein said waveguide plate has at least one coupling grating, which is formed as a coupling grating strip, with lines parallel to one another extending essentially over the whole width or length of

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said waveguide plate.

12. A waveguide plate according to Claim 11

wherein several coupling grating strips are arranged separate and parallel to each other.

13. A waveguide plate according to Claim 11

wherein several coupling gratings are arranged normal to each other.

14. A waveguide plate according to Claim 1,

wherein two or more coupling gratings are superimposed.

15. A waveguide plate according to Claim 1,

wherein one or more coupling gratings are multi-diffractive.

16. A waveguide plate according to Claim 1,

wherein one of said at least one coupling grating covers essentially the whole surface of said waveguide plate.

17. A waveguide plate according to Claim 1,

wherein coupling gratings arranged on said waveguide plate are operable to couple excitation light from one or more light sources into the waveguiding layer and / or to couple out light guided in the waveguiding layer.

18. A sensor platform with a waveguide plate according to Claim 1,

wherein biological or biochemical or synthetic recognition elements for the specific recognition and / or binding of one or

more analytes and / or for the specific interaction with said analytes are immobilized directly on the waveguiding layer or by means of an adhesion promoting layer additionally deposited on said waveguiding layer.

19. A sensor platform according to Claim 18, wherein a multitude of similar or different biological or biochemical or synthetic recognition elements are immobilized in at least one array of discrete measurement areas directly on the waveguiding layer or by means of an adhesion promoting layer additionally deposited on said waveguiding layer.

20. A sensor platform according to Claim 18, wherein an additionally deposited adhesion promoting layer on the waveguiding layer preferably comprises a chemical compound from the groups comprising silanes, functionalized silanes, epoxides, functionalized, charged or polar polymers and "self-organized passive or functionalized mono- or multi-layers".

21. A sensor platform according to Claim 18, wherein, as said biological or biochemical or synthetic recognition elements, components from the group formed by nucleic acids (such as DNA, RNA, oligonucleotides) and nucleic acid analogues (such as PNA), proteins, especially mono- and poly-clonal antibodies, peptides, enzymes, aptamers, synthetic peptide structures, soluable membranebound and from membrane isolated proteins, such as membrane receptors, their ligands, antigens for antibodies, "histidin-tag components" and their complex forming

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partners, cavities generated by chemical synthesis to host molecular

imprints, or whole cells, cell components, cell membranes or their

fragments are immobilized directly on the waveguiding layer or by

means of an adhesion promoting layer additionally deposited on said

waveguiding layer.

22. A sensor platform according to Claim 18,

    wherein areas between the immobilized biological or biochemical

or synthetic recognition elements on the waveguiding layer or on the

adhesion promoting layer additionally deposited on the wavegulding

layer or between the laterally separated measurements areas are

"passivated", for a minimization of nonspecific binding of analytes

or of tracer compounds for said analytes, wherein compounds which

are "chemically neutral" towards the analyte are deposited in said

intermittent areas, comprising preferably compounds from the groups

comprising albumins, especially bovine serum albumin or human serum

albumin, casein, nonspecific polyclonal or monoclonal, alien-

characteristic or empirically nonspecific antibodies for an analyte

to be determined (especially for immunoassays), detergents - such as

Tween 20 -, synthetic or natural lipids, fragmented natural or

synthetic DNA, such as extracts from herring or salmon sperm, that

do not hybridize with polynucleotides to be analyzed (especially for

polynucleotide hybridization assays), or also comprising hydrophilic

polymers, such as polyetylen glycols or dextranes.

23. An arrangement of one or more sample compartments,

    comprising a waveguide plate according to Claim 1 or a sensor

platform according to claim 18 as a base plate and comprising a body

combined with said base plate in such a way, that one or more

spatial recesses are formed between the base plate and said body,

for generation of one or more flow cells, each with at least one

inlet and at least one outlet, which flow cells are fluidically

sealed against each other.

24. An arrangement of sample compartments in a one or two dimensional

array according to claim 23, comprising a waveguide plate according to

claim 1 or a sensor platform according to claim 18 as a base plate and

comprising a body combined with said base plate in such a way, that an

array of spatial recesses is formed between the base plate and said body,

for generation of an array of flow cells, each with at least one inlet and

at least one outlet, which flow cells are fluidically sealed against each

other.

25. An arrangement of sample compartments according to Claim 24,

wherein the pitch (geometrical arrangement in rows and/or columns) of

the inlets of the flow cells does correspond to the pitch (geometrical

arrangement) of the wells of an industrial standard plate.

26. A method for the simultaneous qualitative and/or quantitative

determination of a multitude of analytes, with a component of the group of

components formed by a waveguide plate according to Claim 1, or a sensor

platform according to claim 18 or an arrangement of sample compartments

according to claim 23, wherein one or more liquid samples, to be analyzed

for said one or more analytes, are brought into contact with the

measurement areas on one of said components, exitation light is launched

towards the measurement areas, and wherein at least one of (A) light

emanating from the measurement areas and (B) optionally one or more

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luminescenses from the measurement areas brought into contact with said

sample or said samples, resulting from the binding of one or more analytes

to the biological or biochemical or synthetic recognition elements

immobilized in said measurement areas or resulting from the interaction

between said analytes and said immobilized recognition elements, are

measured, wherein said luminescences are generated in the near-field of the

waveguiding layer.

27.   A method according to Claim 26,

wherein the excitation light is essentially monochromatic and is

launched essentially in parallel.

28.   A method according to Claim 27,

wherein the excitation light is launched linearily polarized, for

excitation of a TE_0- or of a TM_0-mode guided in the waveguiding layer (2).

29.   A method according to Claim 26,

wherein the excitation light from at least one light source is

expanded as homogeneously as possible to an essentially parallel ray bundle

by a beam expansion optics and directed onto the one or more measurement

areas.

30.   A method according of Claim 26,

wherein the excitation light from at least one light source is

divided, by means of one or, in case of several light sources, by means of

multiple diffractive optical elements, preferably Dammann gratings, or

refractive optical elements, preferably micro-lens arrays, into a multitude

of individual beams, with as similar intensity as possible of the

individual beams originating from a common light source, which individual

beams are directed essentially in parallel to each other onto laterally

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separated measurement areas.

31. A method according to Claim 26,

wherein two or more coherent light sources with equal or different

emission wavelength are used as excitation light sources.

32. A method according to Claim 26,

wherein the excitation light for the measurement areas is coupled

into the waveguiding layer by means of one or more coupling gratings.

33. A method according to Claim 26,

wherein (a) the isotropically emitted luminescence or (b)

luminescence that is incoupled into the waveguiding layer and outcoupled by

a coupling grating or luminescence comprising both parts (a) and (b) is

measured simultaneously.

34. A method according to Claim 26,

wherein, for the generation of said luminescence, a luminescent dye

or a luminescent nano-particle is used as a luminescence label, which can

be excited and emits at a wavelength between 300 nm and 1100 nm.

35. A method according to Claim 26,

wherein the luminescence label is bound to the analyte or, in a

competitive assay, to an analogue of the analyte or, in a multi-step assay,

to one of the binding partners of the immobilized biological or biochemical

or synthetic recognition elements or to the biological or biochemical or

synthetic recognition elements.

36. A method according to Claim 26,

wherein a second or still more luminescence labels with similar or

different excitation wavelength as the first luminescence label and with similar or different emission wavelength are used.

37.   A method according to Claim 26,

wherein the one or more luminescences and / or determinations of light signals at the excitation wavelength are determined with selectivity of polarization, wherein preferably the one or more luminescences are measured at a polarization that is different from the polarization of the excitation light.

38.   A method according to Claim 26,

wherein changes of the effective refractive index are determined in addition to the determination of one or more luminescences.

39.   A method according to Claim 26 for the simultaneous or sequential, quantitative and / or qualitative determination of one or more analytes from the group comprising antibodies or antigens, receptors or ligands, chelators or "histidin-tag components", oligonucleotides, DNA or RNA strands, DNA or RNA analogues, enzymes, enzyme cofactors or inhibitors, lectins and carbohydrates.

40.   A method according to Claim 26,

wherein the samples to be examined are, for example, aqueous solutions, such as, in especial, buffer solutions, naturally occurring body fluids, such as blood, serum, plasm, lymph or urine, or egg yolk or optically turbid liquids or tissue fluids or surface water or soil or plant extracts or bio- or synthesis broths, or are taken from biological tissue fragments or cell cultures or cell extracts.

41.   The use of a component from the group of components formed by a

waveguide plate according to claim 1, a sensor platform according to claim 18, and an arrangement of sample compartments according to claim 23, and/or of a method according to claim 26, for quantitative and/or qualitative analyses for the determination of chemical, biochemical or biological analytes in screening methods in pharmaceutical research, combinatorial chemistry, clinical and preclinical development, for realtime binding studies and the determination of kinetic parameters in affinity screening and in research, for qualitative and quantitative analyte determinations, especially for DNA- and RNA analytics, for the generation of toxicity studies and the determination of gene or protein expression profiles and for the determination of antibodies, antigens, pathogens or bacteria in pharmaceutical product development and research, human and veterinary diagnostics, agrochemical product development and research, for patient stratification in pharmaceutical product development and for the therapeutic drug selection, for the determination of patbogens, nocuous agents and germs, especially of salmonella, prions, viruses and bacteria, in food and environmental analytics.

42. A process for producing at least one continuous grating structure formed as a line grating with distances of between 100 nm and 2500 nm between consecutive grating lines on a surface portion of a substrate, by covering the surface portion with a photoresist layer,

bringing the surface portion into a near field of a phase mask having a grating structure, with the photoresist layer facing said mask,

exposing the phase mask at an angle which departs from the Lithrow angle (θ_L) or from 0° by no more than 10°, preferably by no more than 5°,

developing the photoresist layer and subjecting the surface portion

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to an etch process to produce the grating structure,

removing the photoresist layer,

wherein the phase mask is structured in advance by photolithography with the two-beam interference method or is derived from a master copy structured in this manner.

43. The process according to Claim 42,

wherein the extension of the at least one grating structure is at least 0.5 cm, preferably at least 1 cm parallel to the lines.

44. The process according to Claim 42,

wherein the surface area of the at least one grating structure on the phase mask is at least 10 cm^2.

45. The process according to Claim 42,

wherein the exposure of the photoresist layer is to a mercury-vapour lamp.

46. The process according to Claim 42,

wherein the exposure of the photoresist layer is to an excimer laser or argon laser.

47 The process according to Claim 42,

wherein the phase mask comprises atransparent substrate and a layer interrupted in a structured way optically inactivating the grating structure.

48. The process according to Claim 47,

wherein the interrupted layer consists of a nontransparent material, particularly metal, and preferably is a chromium layer.

49.   The process according to Claim 48,

wherein the substrate is a quartz substrate.

50.. The process according to Claim 42,

wherein the side of the phase mask facing the photoresist layer is covered by an antireflection layer.

51. The process according to Claim 42,

wherein during the exposure of the photoresist layer, the photoresist layer is in vacuum contact with the phase mask.

52. The process according to Claim 42,

wherein the thickness of the photoresist layer is at most 200 nm.

53. The process according to Claim 42,

wherein the photoresist layer prior to exposure is covered by a reflection-reducing layer.

54. The process according to Claim 42,   .

wherein during the exposure of the photoresist layer, the distance between this layer and the phase mask is between 2 μm and 100 μm.

55. The process according to Claim 42,

wherein the etch process is reactive ion etching, preferably with

a gas containing at least one of the following components: Ar, $CHClF_2$, CHF_3.

56. The process according to Claim 42,

wherein the material of the substrate essentially is quartz, silicon, thermally oxidised silicon, germanium, silicon-germanium, a III-V compound semiconductor, or lithium niobate.

57. The process according to Claim 42,

wherein at least one transparent layer having a refractive index different from that of the substrate is applied to the surface portion after applying the grating structure.

58. The process according to Claim 57,

wherein the grating structure and the transparent layer are formed in such a way that the coupling angle (Θ) changes by at most 0.1°/cm along the line and the absolute value of deviation of the coupling angle (Θ) from a target value does not exceed 0.5°.

59. The process according to Claim 57,

wherein the transparent layer is applied by reactive DC magnetron sputtering, in particular pulsed DC sputtering or AC-superimposed DC sputtering.

60. The process according to Claim 57,

wherein the thickness of the transparent layer is between 50 nm and 5000 nm.

61.   The process according to Claim 57,

        wherein the material of the transparent layer is Ta_2O_5, Nb_2O_5, TiO_2, ZrO_2, Al_2O_3, SiO_2-TiO_2, HfO_2, Y_2O_3, SiO_xN_y, Si_3N_4, $HfO.,Ny$, AlO,N_y, TiO_xN_y, MgF_2 or CaF_2.

62. Optical element, produced by the process according to Claim 42.

63.   An evanescent field sensor plate with a platelike substrate having, on a surface portion, at least one continuous coupling grating formed as a line grating with a grating period between 150 nm and 2000 nm which parallel to the lines extends over at least 0.5 cm and bears a transparent layer with a refractive index different from a refractive index of the substrate,

        wherein the coupling angle (Θ) changes by at most 0.1°/cm along the line and the absolute value of deviation of the coupling angle (Θ) from a required value on the evanescent field sensor plate does not exceed 0.5°.

64.   The evanescent field sensor plate according to Claim 63,

wherein the extension of the coupling grating along the line is

at least 1 cm.

65.   The evanescent field sensor plate according to Claim 63

wherein the surface area of the coupling grating is at least 10

cm^2.

66.   The evanescent field sensor plate according to Claim 63,

wherein the coupling angle (Θ) changes by at most 0.05°/cm along

the line.

67.   The evanescent field sensor plate according to Claim 63,

wherein the absolute value of deviation of the coupling angle(Θ)

from its mean value on the evanescent field sensor plate does not

exceed 0.3°, preferably not 0.15°.

68.   The evanescent field sensor plate according to Claim 63,

wherein the refractive index of the transparent layer is between

1.65 and 2.80.

69.   The evanescent field sensor plate according to Claim 63,

wherein the transparent layer consists of Ta_2O_5, Nb_2O_5, TiO_2, ZrO_2,

Al_2O_3, SiO_2-TiO_2, HfO_2, Y_2O_3, SiO_xN_y, Si_3N_4, HfO_xN_y, AlO_xN_y, TiO,Ny, MgF_2 or

CaF_2.

70.   The evanescent field sensor plate according to Claim

63,

wherein the thickness of the transparent layer is between 50 nm and 200 nm.

71. The evanescent field sensor plate according to Claim 63,

wherein the groove to land ratio of the at least one coupling grating is between 0.3 : 1 and 3 : 1, preferably between 0.7 : 1 and 1.5 : 1.

72. The evanescent field sensor plate according to Claim 63,

wherein the grating depth of the at least one coupling grating is between 5 nm and 75 nm.

73. The evanescent field sensor plate according to Claim 63,

wherein the at least one coupling grating covers only part of the surface of the evanescent field sensor plate while a remaining part remains free.

74. The evanescent field sensor plate according to Claim 73, further including at least one coupling grating formed as a strip extending in parallel to the lines, essentially over the entire width or length of the evanescent field sensor plate.

75. The evanescent field sensor plate according to Claim 74,

wherein several coupling gratings in the form of strips are arranged at a distance parallel to each other.

76. A microtitre plate with an evanescent field sensor plate according

to Claim 63 further including an added honeycomb-shaped top part which laterally delimits each of the cavities arranged in a regular array, the bottom of each of the cavities being formed by the evanescent field sensor plate.

77. An optical coupler for communications technology with a platelike substrate with, on a surface portion, at least one continuous coupling grating formed as a line grating with a grating period between 100 nm and 2500 nm which parallel to the line of the grating, extends over at least 0.5 cm and bears a transparent layer with a reflective index different from that of the substrate,

   wherein the absolute value of deviation of the coupling angle (Θ) from a required value on the coupling grating does not exceed 0.5°.

78. The coupler according to Claim 77

   wherein the extension of the coupling grating along the line is at least 1 cm.

79. The coupler according to Claim 77,

   wherein the surface area of the coupling grating is at least 10 cm^2.

80. The coupler according to Claim 77,

   wherein the coupling angle (Θ) changes by at most 0.1°/cm along the line of the coupling grating.

81. The coupler according to Claim 80,

   wherein the coupling angle (Θ) changes by at most 0.05°/cm along

the line.

82.   The coupler according to Claim 77,

      wherein an absolute value of deviation of the coupling angle (Θ)
from its mean value on the surface portion does not exceed 0.15°.

83.   The coupler according to Claim 77,

      wherein the refractive index of the transparent layer is between
1.65 and 2.80.

84.   The coupler according to Claim 77,

      wherein the transparent layer consists of Ta_2O_5, Nb_2O_5, TiO2, ZrO2,
Al_2O_3, SiO_2-TiO_2, HfO_2, Y_2O_3, SiO_xN_y, Si_3N_4, HfO_xN_y, AlO_xN_y, TiO_xN_y, MgF_2 or
CaF_2.

85.   The coupler according to Claim 77,

      wherein the thickness of the transparent layer is between 50 nm
and 200 nm.

86.   The coupler according to Claim 77,

      wherein the groove-to-land ratio of the at least one coupling
grating is between 0.3 : 1 and 3 : 1, preferably between 0.7 : 1 and
1.5 : 1.

87.   The coupler according to Claim 77,

      wherein a grating depth of the at least one coupling grating is
between 5 nm and 75 nm.

88. The coupler according to Claim 77,

wherein the surface portion bears at least two regular coupling gratings with different grating periods.

89. The coupler according to Claim 77,

wherein the surface portion bears at least one irregular coupling grating in which the distance between neighboring grating lines is not constant.

90. The coupler according to Claim 89,

wherein, in the irregular coupling grating, the grating period only changes in a linear direction normal to the lines.

91. A device for monitoring a wavelength with a coupler according to claim 89 further including a detector assembly arranged directly beneath the coupler and having at least two photodetectors arranged consecutively normal to the lines.

92. The device according to Claim 91,

wherein the detector arrangement is displaceable in a direction normal to the lines relative to the coupler.